

2003 Transportation Summit Planning Team

Experts Comment on

ASSET MANAGEMENT

ASSET MANAGEMENT

July 28, 2003

8:30 a.m. to 4:30 p.m.

Secondary Center, Lake Michigan Conference Room, Lansing, MI

AGENDA

WELCOME

Facilitator: Kirk Steudle, MDOT Chief Deputy Director

Discussion Moderators:

Kirk Steudle, MDOT Chief Deputy Director

Carmine Palombo, SEMCOG Director, Transportation Planning

EXPERTS SPEAKING ON THE ISSUES

ASSET MANAGEMENT COUNCIL

Rick Lilly, MDOT
Asset Management Coordinator

REBUILDING THE URBAN INTERSTATE

Jim Steele, FHWA
Division Administrator for the
Michigan Division

SYSTEM APPROACH TO PROJECT SELECTION

Steve Warren, Kent County Road
Commission Deputy Director

PAVEMENT MANAGEMENT

Dan Sokolnicki, MDOT
Pavement Engineer, Construction
& Technology

RIGHT OF WAY CONDITIONS

Greg Johnson, MDOT
Metro Region Engineer

SUMMARY OF FUTURE OPPORTUNITIES

Frank Cardimen
ITS Michigan

PLANNING ITEMS

Presenting the Action Plan Form

Planning Team's Comments on the Issues

Drafting the Action Plan

Proposing Summit Format Options

ASSET MANAGEMENT COUNCIL

Expert Speaker: Rick Lilly, MDOT Asset Management Coordinator

Background

- The Asset Management Council is a cooperative venture between Michigan Department of Transportation and County Road Association of Michigan. Passage of Act 499 (Public Acts 2002). Replaced section 9-A of Act 51.
 - The Asset Management Council reports directly to the State Transportation Commission because, according to its constitution “the [State Transportation] Commission is only body that can direct Michigan Department of Transportation.”
 - When the Asset Management Council makes a recommendation to State Transportation Commission, it becomes policy. This is a joint partnership.
 - Currently, the Asset Management Council consists of 10 members, with 1 more expected (Data Agency).
 - First meeting was held on 10/2002. Meetings are held monthly on the 1st Wednesday.
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Key Concepts

Law is based on 6 key concepts:

1. Implements the following recommendations from the Act 51 Funding Committee:
 - To establish asset management throughout the state and create an Asset Management Council
 - To retain current distribution formula (however, may change it later)
 - [Legislature] To obtain timely and accurate data for distribution
2. Moves away from ‘traditional needs’ studies toward an ‘on-going analysis’ of needs that decision-makers can use to maintain the system.
3. Develops a customer-focused perspective:
 - View the system ‘the way the users drive it’ and not ‘by who owns it.’
 - Roads that function the same way ought to be treated and funded the same way.
4. Continues the direction set in the Intermodal Surface Transportation Efficiency Act (of 1991), which seeks to strengthen the roles of Regional Planning Agencies and Metropolitan Planning Organizations and furthers the development and implementation of performance measures.
5. Focuses on the Federal-Aid Road and Bridges, arterials (freeways and non-freeways), collectors and locals.
6. Engages the Michigan Department of Transportation, road commissions and cities in working cooperatively to provide the best system we can for Michigan’s residents and businesses.

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**Key
Concepts,**
Continued

To look at entire system, from the point of where raw materials are taken out to the final product produced, and approach that system as a ‘unified whole.’

**Major
Activities**

- System Profile and Survey
 - Passed A Work Program
 - Filed an Annual Report (see Web site)
 - Approved Budgets for FY 03 and FY 04
 - Established a Web page (URL is **www.Michigan.gov/mdot**, click first on **About MDOT**, then **Transportation Commission**, and then click the link to **Asset Management Council**.)
 - Selected PACER and RoadSoft Software Applications for Data Collection
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**System
Statistics**

Statistics on Federal Aid Mileages, Arterial Distribution, Collector Distribution, and State Distribution reveals that the State owns the bulk of arterial miles while counties own the bulk of collector miles.

This raises questions about managing the road system properly.

Current statistics:

- 617 Act 51 agencies
- As of 7/1/02, certification was over 120,060 miles
- 83 county road commissions
- 533 agencies are cities / villages
(This represents 86% of total: 225 own less than 10 miles of roads, 153 own less than 25 miles, and 39 own over 100 miles.)
- Only 26 % of agencies that receive Act 51 funds own over 50 miles of roads.
- Michigan Department of Transportation has the largest system (9,717 route miles).
- Oakland County Road Commission ranks second, Detroit is third, and Kent County Road Commission is fourth.
- Grand Rapids is the second largest city (865 route miles)
- 77 counties own more roads than Grand Rapids.

KEY POINT: We have too many agencies that own roads. Now we have more cities that want to own roads. The system is diluted in ownership and miles.

**Survey
Results**

- Respondents - of 617 surveys distributed, 36% rate of return or 224 responses.
- Respondents reported on the use of Pavement Management System.

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**Survey
Results,
*Continued***

- 99 agencies or 46% of the respondents are using a Pavement Management System.
- These statistics include:
19 cities / villages under 50 miles; 4 cities over 50 miles; 21 cities over 100 miles use; 54 counties, and MDOT (Michigan Department of Transportation)

To do Asset Management properly, a PMS is necessary. When only 99 out of 224 agencies in Michigan use a PMS, we still have a long way to go.

**Systems
Currently
in Use**

- RoadSoft (66 agencies)
 - MicroPaver (10 agencies)
 - Stantec (5 agencies)
 - CarteGraph (3 agencies)
 - Other Systems (15 agencies)
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**Annual
Report**

- Approved in April 2003
 - Submitted to State Transportation Commission and Legislature
 - Partial Report on the Pilot Project
 - Consists of report on the conditions of roads and bridges with snapshot of the dollars spent in the previous year
 - Data collection process is coordinated by the Metropolitan Planning Organizations and the Regional Planning Agencies
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Summary

The Asset Management Council provides an annual investment report on:

- The condition of the system
- The dollars spent in previous calendar year on that system
- The projects anticipated for construction over next 3 years

This is ongoing analysis that legislature can have every year.

Q&A

Q: Are there plans for the future data collection and reporting, on other than roads and bridges?

A: After Council collects data for 3 years, then we will look at the model and see what it tells us. It will go beyond this at that time, but currently it only focuses on road and bridge condition only.

Q: Do you track data on bridges that are functionally obsolete?

A: No, this was debated, but it was decided that if we looked at functionally obsolete bridges then we would need to do the same for roads. However, we found we couldn't handle the size of this issue.

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Q&A,
Continued

Q: Is there another agency or similar requirement that calls for looking at other modes of transportation?

A: No. This amended section 9A of Act 51 is intended for highways. During the deliberations, Transit was one of the groups 'at the table,' but they had a separate report from the Act 51 committee. They were asked if they wanted to be a member of the Council, and they declined the offer.

REBUILDING THE AGING URBAN INTERSTATE SYSTEM

Expert Speaker: Jim Steele, FHWA Division Administrator for the Michigan Division

Background

- In 1992, said the Interstate is ‘done.’ Few miles left to do, so allocated those dollars only. No new money except for maintenance. To build more Interstate, then use regular dollars.
- In 2000, we became concerned about the system and what we saw happening. Let’s look at where it is and decide where we want to go.

Today our transportation system is the glue that makes our economy prosper.

21st Century Transportation System

- Increased need for more dollars
 - Increased demand for users
 - Need to get more out of what we have
-

Customer Desires- Then and NOW

- 1900 - Wanted all weather roads to get to market
 - 1950 - Dreamed of driving non stop across country
 - 2000 - Demand smooth roads, good bridges and a congestion-free drive
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Goals of Transportation Agencies- Then and NOW

- 1900 - Get the farmer out of the mud (we had road agencies until the 1930's and 40's)
 - 1950 - Build a transcontinental freeway system (Interstate)
 - 2000 - Still searching – some call it an Operational Phase. We need to start looking at systems.
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Contrasting Viewpoints

- The road agencies and transportation agencies were public works agencies.
 - FHWA is also involved in Asset Management movement. Among the peculiarities of American governments is their tacit belief that infrastructure never dies. A capital project, they assume, needs only its initial investment. Once built there is no ‘need.’
 - For several years we have heard debated: the Interstate is done. Now what?
 - Congress and the nation’s view point was that this is what we got: a new system, a new car, and we’re ready to go.
 - But this system took us 45 to 50 years to build, and the earlier sections now need repair. The back end is falling off as the last sections are just getting completed.
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No National Vision

What do you want the Interstate System to be in 20 years? A well maintained 50's or 60's facility OR a modern 21st century facility?

- What do we need in 30 years on I-94? It took us 45 years to build it, so if we want something in 30 years then we need to be looking for it now, not in 30 years!
 - Do we have vision for the Interstate in 2020? A few states have a view within their borders. AASHTO (American Association of State Highway and Transportation Officials) does not have one and FHWA (Federal Highways Administration) does not have one.
 - **There is no national vision.**
 - Furthermore, is 20 to 30 years even adequate, or should we be talking out even further?
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Asset Management

Asset Mgt can help:

- The Interstate is a tremendous national asset and represents \$114.3 billion. It gives us facilities for economic growth, rapid movement of goods and distribution of supplies throughout the US, rapid evacuation of large populations centers in times of severe weather and major emergencies; yet, it is constantly under pressure to add more interchanges and become the main street of every town / village, etc.
 - Yet, it has no national champion.
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Lost Opportunities

- Most Interstate rehabilitation projects are designed for a 15 to 25 year period.
 - Most Interstate projects are not intended to upgrade the facility.
 - So unless FHWA pushes the envelope, we are simply repairing what we have!
 - So are we going to be content with a 50's or 60's Interstate or aim for something that meets today's and tomorrow's needs?
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Multi-standards

Most of us forget the Interstate system was built over a 40 + year timeframe, during which standards changed several times.

For example, standards have significantly changed regarding:

- Shoulder width
 - Vertical clearances
 - Ramp tapers
 - Shoulder on long bridges
 - Left hand on / off ramps
 - Originally designed for 10% trucks, are now faced with 15-30% trucks and growing in some corridors
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- Bridge Conditions**
- In 1997, our bridges needed to be repaired.
 - Bridges that were in ‘good’ condition back then have steadily declined.
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- Pavement Conditions**
- In the pavement area it is about the same.
 - In 1997 we were at 76% ‘Good-to-Fair’ Interstate pavement conditions.
 - Now we are 81% ‘Good-to-Fair.’
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- First Interstate in Detroit**
- Majority of the Interstate was built in the 1950’s.
 - Previously made us a national ‘leader’ with its Interstate.
 - Today, Detroit has a tremendous economic need.
 - The very first sections of Michigan’s Interstate were built in Detroit, so this can be expected.
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- No Champion- No Legislation**
- When presented this in Washington, they said do a study to see what the real condition is to see if we really do have a problem.
 - Perhaps we need a new separate program to encourage a future-vision? This was cut out, so there is nothing now in the proposed legislation.
 - Field reps are trying to talk with each DOT with this information. If we don’t do more than just repair then we will continue to have a 50's facility.
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Q&A

Q: Why is there no champion?

A: Because people still believe that the system we have is a go. We also haven't figured out that if we simply maintain what we have, we will only have what we built which is a 1950's / 60's system and is not adequate for the 21st century.

Q: Are there states in worst condition or is this an across-the-board problem?

A: This is an across-the-board issue even though some states are a little better off than others. One of the big concerns is money. Some will get more money because they haven’t fixed their system and others have spent their own dollars, so there is competition for dollars. Border issues where there is huge contribution to our economy. Take a look, for example, at when bridges were closed during 9/11. This is a huge issue to our economy.

When we look back at Michigan’s history, I think we can see a total transformation of the agencies responsible for building the system. They have been going from ‘builders’ to ‘maintain-ers.’ This is the real growing pain. It is a completely different philosophy of putting projects out vs. maintaining them. It takes time and leadership to make this transformation.

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Q&A,
Continued

Q: Research indicates that a dollar issue or funding issue has existed for over 30-some years. When we look at the gas tax dollars, Michigan has ranked 46 to 50 of all states / miles driven in funding. In other issues, we are in the top 5 or 6 of other states on education, etc. So how do we refocus this?

A: Let's not forget that we don't see national leadership on transportation issues because there are social costs and environmental costs. This is no longer seen as a panacea as it readily was.

It has been forgotten for 35 years. The northern states where there is a relationship between weather and the system, Michigan still ranks 25th so it has not been a priority here among our peer states.

Q: I-75 around Saginaw where there are temporary barriers for traffic where utilize the same lane for north and south traffic. This seems like a tremendous savings. Is this in pilot stages and is it viable?

A: This was done on the Golden Gate.

But we have to buy special equipment. We can do this when don't have the physical space to add a lane, but the problem is that the planning process should tell us if this will be effective and for how long.

We tend to look at things in small segment projects rather than larger issue. Consider car pooling. We are in a project process and need to get something done, so don't look at bigger issues.

Q: Isn't one of the problems we are looking at that we don't have a base understanding of what it will cost to get us out of the 50's and 60's mentality?

A: Six miles of freeway in Detroit is estimated at \$1 billion. Joe Citizen doesn't understand this and don't understand why we aren't out there fixing things.

To make the right change requires a tremendous cost.

But we have to get the message out there about the cost to make this change.

[Discussion]

BUT the sooner we start--the cheaper it is.

Things continue to go up in cost each year. Sooner or later we will be forced to doing something. If we wait until later, we may have fewer choices.

In the future, people will have a very difficult time because these are big and complex issues. Last year I went to Europe scanning work and looked at warranties. Here's what I found:

- I found that the European countries have taken a major section of freeway and contracting with the contractor to upgrade and operate the freeway.
- They have rigid performance standards about skid resistance, etc.
- I told them we were wrestling with Asset Management and asked how do you justify this to your funding sources? They said, "We had a problem at first with our financial people, then we sat down and said we are not pricing this facility correctly to determine what it is giving us economically. We added that value and then it made sense."

We are not doing this in the US. Here we just look at what it costs to replace it in its current condition.

SYSTEM APPROACH TO PROJECT SELECTION

Expert Speaker: Steve Warren, Deputy Director, Kent County Road Commission

- Background** There is a tremendous need to upgrade and expand the current system. But as we consider these major improvements to Kent County we must continually keep an eye on what is happening to the system.
- We have to explain to our elected and appointed officials that as we advocate for improvement dollars that the overall condition of our system is improving as well.
 - I believe what we are doing *is* Asset Management. This is not rocket science; it is just good old-fashioned *planning*.
 - We are looking at the consequences on our system of the decisions we make today. With computers and with the Geographic Information System and large database engines, we have the ability to forecast based on the deterioration rates of pavements what will happen to the system condition over the next 4 or 5 years.
- In our process, the key is our ability to forecast the effects on our current system if we make a certain set of road improvements.**
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- Pavement Condition Life Cycle Information** Currently, the information we are collecting by region is assembled on a statewide report (State of State of Road Improvements).
- The intent is for this information to flow back to the local unit of government.
 - Each country road commission, Michigan Department of Transportation, cities and villages will receive this information.
 - Based on the PACER rating, you can determine the condition of your system today.
 - We hope our agencies will take this information, assess their decisions about what improvements to make, and forecast it to the future and determine if we are improving the overall condition.
 - Our elected and appointed officials need to develop a keen awareness of the impact- on tomorrow- of their decisions today.
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- Systems Approach Theory** So how do we select projects using a systems-approach?
- As we improve a road, its condition is returned to ‘excellent’ condition. Over time, however, the condition of the pavement will deteriorate at the classic mathematical rate.
 - In the near future, the deterioration rate begins to level off until that certain *point in time* at which the condition of the road fails significantly. There has been a lot of research and documentation on this.
 - Therefore, if we can improve the road at *this point*, then we can spend less on rehabilitation than on significant repair.

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**Systems-
Approach
Theory,
*Continued***

The theory is that for each an every road we want to identify the point at which the deterioration occurs exponentially.

At that time, we want to do preventive maintenance (chip seals, thin overlays), while the cost is much less than waiting until the road falls apart, and we are forced to go ahead with total rehabilitation.

**Using
PACER and
MicroPaver**

PACER provides an index. This is a numerical range of 0 to 100.

We use this in Kent County in conjunction with MicroPaver.

- We work with cities and use the MicroPaver program to evaluate our roads.
 - Roads have to qualify on their Pavement Condition Indicator (PCI rating). As roads hit this 70 to 45 range, they are ideal candidates for maintenance. This is where in a perfect world we would go in and make these improvements.
 - The reality is that there are many conflicting issues. There just isn't enough money; and, this is true for 99% of the agencies in Michigan.
 - So we are constantly faced with doing some maintenance projects and doing some expansion projects.
 - For example, Steele Case needed a road to handle much higher traffic and heavier loads. In theory, we should get federal dollars to expand, but this also interrupts the ideal preventive maintenance. We have to make trade-offs. We have to consider all of the factors and impacts.
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**Defining
“Asset
Management”**

The Federal Highway Administration's definition of Asset Management is useful here:

“Economic assessment of trade-offs among alternative investment systems based upon a comprehensive data management system and professional judgment.”

- This is not just putting data into a black box and out pops the right answer. Professional judgment must play into all these decisions.
- We have to reach consensus between traffic engineers, planners, etc. We need to combine information from all available sources.

Isn't 'Asset Management' really just *good planning*?

- **Planning is not about making decisions in the future, but the future of our present decisions.** With today's technology, we can do planning better. We can forecast the consequences of the decisions we make today. We need to be sure there is an adequate investment in our system and explain it to others.
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Kent County Road Commission's System Approach to Project Selection	<p>In Kent County, we put out a 5-year program.</p> <p>We discuss it with our officials and with the Michigan Department of Transportation.</p> <p>We use a six step process:</p> <ol style="list-style-type: none"> 1. Survey Conditions 2. Document Current Needs 3. Select And Package Projects 4. Analyze Future Conditions 5. Update Improvement Program 6. Monitor Performance
Surveying Conditions	<p>Through the regional planning process, we rate 1/3 of our system annually.</p> <ul style="list-style-type: none"> • We don't do 100% of the system each year, just 1/3! • This is an intensive evaluation. We get out of the car and measure cracks and rutting. • We divide our system into 3 categories: <ul style="list-style-type: none"> ○ GOOD: which needs little to no maintenance; ○ PRESERVE: which includes those roads that need preventive maintenance; and ○ REBUILD: which is that part of the system that has gone beyond preservation and is so deficient that maintenance would be a waste of dollars. • This is where economic development and traffic issues come into play. This includes existing and future congestion, safety improvements, and bridge inspections, which are competing issues for the road improvement dollars.
Documenting Current Needs	<p>Listing Reconstruction and Preventive Maintenance Improvements:</p> <ul style="list-style-type: none"> • PCI • Traffic Volumes • Classification • <p>Listing Major Investment Projects:</p> <ul style="list-style-type: none"> • Access Improvements • Expansion Projects
Selecting & Packaging Projects	<p>Using 5-Year Horizon, we select major access improvements are where we are placing a significant part of our dollars. This is something our officials and others who participate in this economic engine feel is important.</p>

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Selecting & Packaging Projects, <i>Continued</i>	<p>In a participatory process, we begin to package a five year list of projects.</p> <ul style="list-style-type: none">• We bring in the packages where we need to move them ahead, others drop out, and other times projects are added.• Sometimes we have a grant for economic development and can move a project ahead. We need to allocate these dollars to match for federal or state aid.• Sometimes local officials may get frustrated when a project is on the schedule, and then when a new project comes out, it falls off. There were other considerations that occurred and changes had to be made.
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Analyze Future Conditions	<ul style="list-style-type: none">• Primary Road System• Economic Support Network• All-Season Network• Local Road System and by Township
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Update the Five-Year Program	<p>Expansion New Construction Widen</p> <p>Construction Reconstruction Heavy Maintenance</p> <p>Preservation Thin Overlays Surface Treatments Bridge Maintenance</p> <p>Intersections</p>
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Performance Monitoring	<ul style="list-style-type: none">• Track Annual Deterioration Rate for Various Types of Improvements• Correlate with Initial Pavement Condition Indicator Ratings
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System Approach to Project Selection in Kent County	<p>The Asset Management process allows us to forecast the consequences of the decisions we make today on the road system. We can say with confidence that this package of projects will result in the overall improvement of the system.</p> <ul style="list-style-type: none">• The Board and management have to decide what they are comfortable with because while the overall roads are getting better, there are more roads that are not functional.• We work with the townships and villages on when to do preventive maintenance on their roads. We can help them decide how much they need to invest in order to maintain a reasonable level of service on their roads.
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**System
Approach
to Project
Selection in
Kent
County,
*Continued***

- We then update the five year program. Any type of major expansion of the system exists on the program right along side of it. There is also the preventive maintenance category. This is treatment to those who are still salvageable without a very large investment.
 - When we improve a section of the road, then we are out there constantly forecasting the performance of that road and what the future will be.
 - We track annual deterioration rate for various types of road improvements. We measure the cracks at least once every three years. We correlate this with initial Pavement Condition Indicator (PCI) Ratings. This means that if we have a pavement rated as a 50 vs. a 70 (both qualify for preventive maintenance), we can track the performance of a thin overlay and know that if we apply at a 70 vs. a 50 then the life of the overlay is much better.
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Q&A

Q: When doing overall rating, do you take into account other modes of transportation?

A: Through our Metropolitan Planning Organization, we participate with our transit agencies which have a large effort with non-motorized and pedestrian traffic. We are doing major forecasting and creating a long range plan now. As they see the need to improve certain corridors, we are there with them. We work with townships in the construction of grade separated bike paths. The funding is separate. Transit has their dollars and road commissions have their dollars. The disconnect is in funding.

Q: Could you tell us more about how you see this 'disconnect'?

A: When a Metropolitan Planning Organization forecasts traffic, they project the number who will drive, vs. take the bus, etc. The disconnect is in the funding between roads and transit, as a group we need to overcome this disconnect and integrate the funding and planning to get more leverage and less duplication of efforts and fewer gaps even though it could have had to included it in the planning and funding.

Q: What does your approach do for non-motorized transportation?

A: Most of our conversation is about moving cars and our charter is to look at more than just cars. We are talking motorized transportation today, but there are other modes and we are trying to integrate these other modes. When we 'talk' about asset management we have focused on roads, but *our program* has not yet totally focused on these other modes.

Q: How do you get feedback from your constituents?

A: We have an annual event where each township comes in and meets with staff and Board to talk about individual projects. We take this information and present to them in a large group setting ideas. Later, we conduct surveys, drive the roads with them, and determine what needs to be done. It is a constant contact with them.

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Q&A,
Continued

Q: What would you say is the difference between the costs of preventive maintenance vs. rebuild?

A: The gap is large.

Q: Has there ever been done a formal cost benefit analysis of road expansion that gets sold in vs. crowding out the preventive maintenance? It looks like a huge amount of money could be saved by the preventive maintenance. Road expansion promises us a certain number of jobs where a preventive maintenance job would save jobs and cost less.

A: There are safety issues that have to be addressed, and there are economic development issues that have to be addressed. There is a constant trade-off on how to apply the dollars. Through this system we can forecast the future results of how we apply the dollars. We keep coming back to funding, but the point is that Director DeSana talked about economic development. When a new business comes into town taxes come in and everyone gets their share of this increase in taxes except the transportation system. The current funding mechanism does not realize any of this benefit. Keep in mind that many times the business may contribute land for the roadway or dollars for related issues.

PAVEMENT MANAGEMENT

Expert Speaker: Dan Sokolnicki, Pavement Engineer, MDOT Construction & Technology

Why Use a Pavement Management System?

General Intentions in Utilizing a Pavement Management System:

- Assess System Condition Uniformly Statewide
 - Improve Planning Process
 - Improve Engineering Process
 - Communicate More Effectively with Political Leaders and the Public
 - Downsizing
- With government agencies faced with smaller and smaller people resources, the use of technology to keep track of what we are doing is important.**

Objectives in utilizing a Pavement Management System:

- Establish Cost-Effective Long Range and Short Range Programs
 - Maximize Benefit to the Motoring Public
 - Maximize Pavement Condition and Minimize Costs
 - Maintain and Improve Future Pavement Conditions
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MDOT's Pavement Management System

How Does Michigan Department of Transportation use the Pavement Management System?

- Warranties
 - Monitor Pavement Fix Performance
 - Pavement Research
 - Pavement Selection (LCCA)
 - Performance-Related Specifications
-

Pavement Management System/ Data Collection at MDOT

What data does Michigan Department of Transportation collect?

- Continuous videotape coverage (Distress Characteristics)
 - Pavement Surface
 - Roadway Perspective
 - Laser Sensor Measurements (Functional Characteristics)
 - Approximately 12,000 miles covered (Driving Lane Only)
 - Data collected in One Direction for Non-Freeways and Both Directions for Freeways(Divided)
 - Network collection is spread across a two-year cycle, with non-freeway (mostly M-routes) scheduled in even-numbered years and freeways in odd-numbered years
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Pavement Condition Indicators	<p>The following Pavement Condition Indicators are measured and processed using the Pavement Management System:</p> <ul style="list-style-type: none"> • Longitudinal Surface Profile <ul style="list-style-type: none"> ○ Ride Quality Index (RQI) – Rider Comfort Correlation ○ International Roughness Index (IRI) - Standardized Suspension Response • Transverse Surface Profile - Rutting • Surface Distress Index (DI) - Snapshot Condition Indicator • Remaining Service Life (RSL) - Performance Indicator • Friction
Laser Sensor Data Collection	<p>Additional data is collected via vehicle-mounted laser sensor apparatus:</p> <ul style="list-style-type: none"> • Longitudinal Surface Profile <ul style="list-style-type: none"> ○ Readings every Two Inches along roadway surface ○ Both Wheel Paths ○ Translated into both Ride Quality Index (RQI) and International Roughness Index (IRI) • Transverse Surface Profile <ul style="list-style-type: none"> ○ Five Laser Sensors ○ Translated into Rut Depth Measure for both Wheel Paths
Remaining Service Life (RSL)	<p>Remaining Service Life is a Pavement Management System Pavement Performance Indicator.</p> <ul style="list-style-type: none"> • Remaining Service Life (RSL) is the estimated number of years, from a specified point in time, until a pavement section reaches a threshold DI value of “50” where major rehabilitation or reconstruct work should then be seriously considered based on cost-effectiveness. • Remaining Service Life is a function of Distress Index (DI) and its rate of change over time (pavement deterioration rate).
RSL and Performance Modeling	<p>Determining Remaining Service Life by Performance Modeling</p> <ul style="list-style-type: none"> • Non-linear (logistic) growth modeling techniques • Statistically Based • Based on Multiple Distress Surveys • These types of models illustrate well how the pavement is performing. This has been proven by research as well as by experience. <p>Remaining Service Life is determined by defining a uniform section of pavement, based on:</p> <ul style="list-style-type: none"> • Defining a Uniform Section of pavement, using: <ul style="list-style-type: none"> ○ Control Section (or Physical Reference # - PR) ○ Same Pavement Type ○ Same Original Reconstruction Year ○ Range of similar DI values

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**RSL and
Performance
Modeling,**
Continued

- Plotting Uniform Section's historical DI values against time (measured in years).
- Best-fitting a logistic growth curve to the plotted DI points
- Extrapolating from the curve the time point (year) when DI value will equal "50"
- Subtracting the analysis year (usually present) from the extrapolated "DI=50" year, with the difference being the Remaining Service Life value.

**Distress
Index**

DISTRESS INDEX (DI) is the accumulated total of distress points along a defined roadway section (project) length, normalized to a one-tenth mile reference length. DI provides a unit-less "snapshot" condition measure that allows level comparison between pavement sections having different lengths.

- Distress Index =
$$\frac{(\text{Total Points}) \times (\text{0.1 Mile})}{(\text{Project Length})}$$
- An (arbitrarily chosen) Distress Index value of "50" indicates the threshold point at which a pavement section's most cost-effective treatment should be a major rehabilitation or reconstruction. This DI threshold value also corresponds to a Remaining Service Life value of "zero".
- Relative Distress Value is distributed among the various principal/associated distress combinations (type/extent/severity) based on three comparative factors:
 - Reactive Maintenance Costs
 - Repair Costs
 - Functional Impacts
- Actual Point Value assigned to a specific distress type/extent/severity combination is based on the relation of an individual distress to when a tenth-mile segment of pavement would require major rehabilitation or reconstruction.
- Distresses are defined by pavement type (Flexible, Rigid or Composite) and uniqueness of distress characteristics.
- Classification includes principal distress type, extent of principal distress and amount of associated distress (related spalling, cracking, etc.)

**Surface
Distress**

Concrete Principal Distresses include:

Transverse Cracking
Transverse Joint
Delamination
High Steel
Scaling

Longitudinal Cracking
Longitudinal Joint
Reactive Aggregate
Shattered Area
Popouts

Continued on the Next Page

Surface Distress

Concrete Associated Distresses include:

- D Cracking
- Spalling
- Corner Cracking
- Reactive Aggregate
- High Steel
- Delamination

Hot Mix Asphalt Principle Distresses include:

Transverse Tear	Alligator Cracking
Transverse Cracking	Block Cracking
Longitudinal Cracking	Raveling
Longitudinal Joint	Flushing

Distress Survey Workstation

- Interlinked computer and VCR equipment.
 - Allows synchronized viewing of pavement surface/perspective videotape images.
 - Contractor surveyor records observed surface distress characteristics into computer file as pavement is “driven” over.
 - Software ties the recorded distress data to the associated videotape image time code and Control Section mileage values.
-

MDOT Pavement Management Approach

- Raw Distress Survey calls, then assigns, the points that we want assigned to the relative importance of the distresses, and then we total the distress points from the scored data and calculate the Distress Index (DI) value to determine the Remaining Service Life of a uniform pavement section.
 - Use statewide planning people with strategy analysis and the development people then fill this with projects to create a program.
 - This is relatively new stuff even though we have been collecting data for 10 years. This is a new idea to move from building roads to maintaining them. We have a long way to go to know what we need to do with all the information and the data that is and could be collected.
-

Q&A

Q: The Remaining Service Life’s classical definition requires you to look at data installation to data retirement, and then you can determine service life.

This comes from economic theory. Have you done any of these?

A: No, I haven’t studied economic theory.

Q: Do you measure on and off ramps?

A: This issue has been brought up by our regions and is an issue. At this time, we don’t collect data on them now. We assess and measure the condition of driving lanes only.

Continued on the Next Page

Q&A,
Continued

Q: How long a process does it take Michigan Department of Transportation to do this? When do we get data on a specific area?

A: Collecting the data is about a 12 or 13 week process for the van to collect data for an area. Then the surveyors compile the data. We get data from contractor(s) on a two-year basis for \$675,000. We start collecting the first of April and expect data by December. We have a Q&A process in regard to the video tapes. The data continues to come in incrementally for 2002. We just got our first region recently. We will do Q&A until December when all the tapes are received. The Preventive Maintenance program is always driving us to get this information more quickly.

Q: Is this is pavement management system process used only for state-owned roadways?

A: Yes.

RIGHT OF WAY CONDITIONS: Managing Roadside Assets

Expert Speaker: Greg Johnson, MDOT Metro Region Engineer

Our Roadsides as an Asset

- This refers to everything outside the white line or median.
 - In the Metro Region, we have received a lot of complaints about our roadsides. So we will put together a committee to see how we can better invest in our roadside assets.
-

Importance of Properly Maintained Roadside Assets

APPEARANCE

- Unsightly appearance of roadsides is a detriment to attracting tourists. Homeowners and businesses and can add to the general blight of an area.

SAFETY

- Excessive vegetation growth can be a sight hazard - blocking signs and cross street traffic, roadside debris can become airborne, improperly maintained tree growth can become a dangerous obstacle in a runoff accident.

INVESTMENT

- Improperly maintained roadsides can lead to premature pavement failure and associated infrastructure failure.
 - Lack of consistent investment in road side assets can lead to significantly higher future costs.
 - “Cool Cities” must have appropriately “cool” entryways to them.
-

Metro Region Roadside Management

- Metro Region serves 4 counties: Wayne, Oakland, Macomb and St. Clair Counties.
- In all, Metro Region has 4, 590 lane miles of roadway, i.e. ‘maintenance miles.’

Roadside management in the Michigan Department of Transportation Metro Region has been described as akin to maintaining a thousand-mile-long complex linear park with millions of fast-moving vehicles thrown in!

Freeway Mowing Within the Federal Aid Urban Boundaries

- Mow 3 cycles full width on medians \leq 70 feet
 - Mow a 12 foot swath (3 cycles) on the right side of non-depressed freeways
 - Mow a 12 foot swath on medians $>$ 70 feet
 - Mow 3 cycles full width on depressed freeways (Lodge, I-96, etc.)
 - Freeway mowing is limited, in order to *not disrupt* natural habitats. This is a state law.
-

Continued on the Next Page

**Freeway
Mowing,
*Continued***

A “cycle” means mowing the entire system one time. Three full cycles means mowing this area 3 times in a season.

Exceptions:

- Additional with contour mowing in medians and on the right side is permitted with Region approval.
 - Four cycles in core downtown areas.
 - These rules apply to a lot of outside state areas that have urban situations.
-

**Freeway
Mowing
Outside the
Federal Aid
Urban
Boundaries**

- Mow 3 cycles full width on medians < 50 feet
 - Mow a 12 foot swath in 3 cycles on medians > 50 feet
 - Mow a 12 foot swath or to the leading edge of the ditch, whichever is less, on the right side of the freeway in 3 cycles
 - Mow 25% of all medians > 50 feet annually for brush control
 - Mow not more than 50% of all freeways on the right side of the freeway annually, if necessary, for brush control. (Brush control mowing must occur between July 16 and March 1. We have animals living within our right of way so we do this to avoid damaging wild life in the area.)
-

**Boulevard
Mowing
Within the
Federal Aid
Urban
Boundaries**

- Mow all boulevard medians 8 to 10 cycles (Woodward, Grand River Ave.)
 - 3 cycles of tractor mowing on medians with limited development and median landscaping
-

**Boulevard
Mowing
Outside the
Federal Aid
Urban
Boundaries**

- Mow all boulevard medians < 50 feet wide 8 to 10 cycles
 - Mow a 12 foot swath on boulevard medians > 50 feet wide 8 to 10 cycles
 - 3 cycles of tractor mowing on medians with limited development and median landscaping
 - Eliminate sight restrictions at crossovers and intersections and necessary for safety
 - Mow 25% of all medians > 50 feet annually for brush control
-

**Swath
Mowing
Outside the
Federal Aid
Urban
Boundaries**

- Mow 1 to 3 cycles of swath mowing on non freeway routes when the frontage is not residential or commercial
-

NOTE: On all free access roads, the area between the curb and sidewalk or the Right of Way line and the edge of the shoulder is the responsibility of the owners of occupied frontage property.

Litter Program	<p>Litter collection with the exception of service calls for special efforts is performed in conjunction with the mowing program.</p> <p>Additional efforts include the following:</p> <ul style="list-style-type: none"> • Adopt-A-Highway and Adopt-A-Freeway • Alternative Work Force • Department of Corrections, Project Clean Streets • Michigan Department of Transportation Crews from Maintenance Garages supplement above listed litter collection program on the shoulders of many freeways • Other private party efforts (e.g., 8 Mile Improvement, Woodward Ave.) 						
Objectives and Budget for Metro Region	<p>Mowing Program for Freeways and Boulevards</p> <ul style="list-style-type: none"> • Freeways when mowed according to the guidelines are to be neatly cut and trimmed to a height of 5 inches when the turf has an average height of 12 inches • Boulevards when mowed according to the guidelines are to be neatly cut and trimmed to a height of 3 inches when turf has an average height of 6 inches <p>Sweeping Program for State Trunklines</p> <ul style="list-style-type: none"> • The shoulders and gutter pan of all roads with curb and gutter or other barrier receive 4 sweeping cycles • There are a variety of exceptions to this policy statewide based on exceptional debris accumulation, special events in a community, and tracking of material from a construction project <p style="text-align: center;">2003 Metro Region Budget:</p> <table> <tr> <td>Sweeping and Flushing</td><td>\$2,539,600</td></tr> <tr> <td>Mowing and Weed Control</td><td>\$2,461,000</td></tr> <tr> <td>Litter Collection</td><td>\$1,594,700</td></tr> </table>	Sweeping and Flushing	\$2,539,600	Mowing and Weed Control	\$2,461,000	Litter Collection	\$1,594,700
Sweeping and Flushing	\$2,539,600						
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Litter Collection	\$1,594,700						
Challenges to Adequate Roadside Management	<ul style="list-style-type: none"> • Funding levels don't always match customer expectations for roadside appearance • Aging roadside infrastructure (deteriorated urban slopes, retaining walls, aging vegetation) • Illegal vegetation removal (e.g., some people come in and illegally cut trees in order for their billboard to be seen) • Continually escalating levels of littering by motoring public (e.g., trash haulers who have an unsecured load distribute debris and it looks as though we have not picked up trash) • Some urban freeways are hazardous for unskilled groups to pick up litter 						

**Initiatives&
Solutions for
Proper
Management
of Roadside
Assets**

- Match user expectations with appropriate funding
 - Coordination of mowing and cleanup efforts to create seamless corridor appearance
 - Utilize low-maintenance roadside appurtenances
 - Address aging roadside infrastructure through enhancement grants, rehabilitation projects, public-private beautification initiatives
 - Public awareness campaigns (anti-littering, illegal vegetation removal, Adopt-A-Highway)
 - Aesthetic Policy implementation
-

Q&A

Q: To your knowledge, do we have any statistics on the enforcement of litter laws?

A: No.

Q: Are we effectively engaging groups from the community to enhance our roadsides?

A: Occasionally, Master Gardeners have done the designing and then communities provided the plants. This is working well. Also, we have associations like the 8 Mile Corridor Group and the Woodward Avenue Group, and we coordinate with them for beatification activities.

Q: When water runs off impervious surface (roadway) this can have a significant impact on a stream. The stream was created years ago when there were not impervious surfaces. We need to have road sides that can filter that water before it gets to the stream. We should look at ponds and other options. Also, we need to consider of letting the grass growing taller because there is an environmental benefit.

A: You're absolutely right. We need to consider these options. However, it is difficult to convince the public who does not always look to the long-term benefits. Ground cover is a high initial investment, but it pays for itself when we don't have to mow it later.

Q: In regard to street sweeping, is there any effort to upgrade the vehicles to be equipped with high-powered vacuums that lift out metals, etc?

A: As part of our maintenance contract we don't dictate the equipment. We look for the end product. But we could bring this up with our maintaining agencies.

Q: Where do you see the aesthetic policy going?

A: As a tourist state, we want our roadsides to look pleasant. We have wild flower efforts, bridge beautification (design of bridges and flower plantings). This helps with road-rage and gives people a pleasant atmosphere to drive in. In I-94 corridor there will be more extensive campaign to do special effect lighting from private funds. There are many innovative ideas out there.

Continued on the Next Page

Q&A,
Continued

Q: How about road kill?

A: We get a lot of questions about this. We have a policy on removing road kill. In Metro Region we have contract counties that do that for us. It is somewhat complicated to remove and dispose of animals. In the Southwest Region, there is a hotline to call. The garage gets out within 24 hours and removes the animal. This is a detriment. This is a pitfall to not having a well-maintained right of way where animals would not feel so comfortable living/moving about so close to the roadway.

SUMMARY OF FUTURE OPPORTUNITIES

Expert Speaker: Frank Cardimen, ITS Michigan

What is ITS?

ITS is Intelligent Transportation Systems and refers to:

- The use of technology to improve the efficiency of the transportation infrastructure
- The use of technology to improve the functionality and safety of vehicles
- The linkage of infrastructure and vehicle technologies
- A broad range of diverse transportation-related technologies, including: information processing, communications, control and electronics, known collectively as the Intelligent Transportation System.

Applying these technologies to our transportation systems saves time, money and lives!

Why ITS?

- ITS can improve traveler safety
- Not enough dollars to solve traffic problems with construction alone
- ITS can improve efficiency of road system
 - Less disruptive than road construction
 - Less costly (more cost-effective than construction)
 - Maximizes the capacity of the existing system

It is not *the* solution to transportation problems, but it is *part of* the solution.

Why ITS in Michigan?

- Auto Industry
 - Michigan transportation agencies have been in national ITS forefront for years
 - MDOT- Michigan Department of Transportation
 - RCOC- Road Commission for Oakland County
 - SMART- Suburban Mobile Authority for Regional Transportation
 - AATA- Ann Arbor Transit Authority
 - Increasing congestion
 - Economic growth potential
 - Michigan Economic Development Council's "Technopolis Concept"
 - Automation Alley
 - Great Lakes Economic Corridor
-

The Opportunity

Stimulate the technology sector of Michigan's economy to:

- Use traditional auto industry to grow technology sector
- Diversify state's economy
- Reduce reliance of Michigan on 'rust belt' industries

ITS Today in Michigan and the US

- Advanced Management Systems
 - Advanced Information
 - There are 3 segments: the road, the vehicle and the person.
 - The infrastructure side is Advanced Management Systems
 - The vehicle and person are Advanced Information Systems
-

The MITS Center in Detroit

One of the most advanced management system in Michigan is at the Michigan Department of Transportation's Michigan Intelligent Transportation Systems Center (MITS Center).

At the MITS Center,

- Data and information is collected.
- The system is joined with the Michigan State Police and with the Michigan Department of Transportation.
- It helps with safety, congestion, and the overall system improvement.

Each one of these represents part of the system to collect data to manage the system in a faster and safer way.

- Traffic Management System
- Motorist Information System
- Major Traffic Information Hub
- Michigan Department of Transportation Communications Network

Closed Circuit Cameras, Radio and TV Traffic Reports, Changeable Highway Message Signs, Interactive Voice Response, 24-Hour Traffic-Only Programming, Real-Time Internet Access, and much more...

Incident Management Team in the Detroit Area

- "Courtesy Patrol" - largest operation in US
 - Successful multi-agency effort utilizing MITSC and Michigan State Police
 - Recognized by Governor's Traffic Safety Advisory Commission (GTSAC) with a state safety award (among private and public agencies)
-

ITS Technologies deployed by the Road Commission for Oakland County

THE REALITY:

The Road Commission for Oakland County will never have enough money to "build" its way out of congestion.

THE RESULT:

We turned to ITS technology to help resolve the problem.

FAST-TRAC

Another advanced management technology in Michigan is the Road Commission's FAST-TRAC (Faster and Safer Travel-Through Routing and Advanced Controls).

FAST-TRAC developed because:

- Realized that intersections are the key to traffic flow (bottlenecks)
- Discovered the state of the art adaptive signal control technology
- However, need reliable vehicle detection. Pavement loops are problematic due to Michigan's winters.

FAST-TRAC Advantages

FAST-TRAC works through the linkage of:

- Autoscope Vehicle Detection System
- Management Computer System
- Regional Computer System
- FAST-TRAC Controller System

FAST-TRAC allows us to:

- Use Adaptive Signaling (adjusts splits and cycle lengths, can end phases early, can skip a phase with no demand)
- Use Continuous Signal Timing Updates
- Utilize Central Monitoring
- Maximize Capacity of the Existing Roadway System

Advantages:

1. SAFETY FACTOR- Fewer serious injury accidents.
The number of accidents didn't change too much, but the seriousness of the accidents changed by 50%.
2. TIME FACTOR- There is time improvement when compared to optimized, fixed-time system. Stopped delay improvements (20% reduction in delays).
3. PUBLIC OPINION- Public opinion survey shows that the public perceives the system as safer because it responds to changing traffic patterns.
4. HANDLING EMERGENCIES- System responds well to traffic changes, successfully handling unexpected emergencies.

Example:

Large gravel truck flips over, closing a main north / south freeway. What happened was that the system adapted to the emergency situation and the GREEN LIGHT took care of the off-coming traffic. Traffic was diverted smoothly onto arterial roads during rush hour. On its own, FAST TRAC maintained rush hour signal timing on N/S roads parallel to the freeway until freeway was re-opened later that night.

5. DISASTER MANGEMENT- System can help manage traffic flow during a disaster.

Example:

Turning all traffic signals GREEN in one direction during an emergency evacuation.

Growth of FAST-TRAC	<p>Started in 1992 with 28 intersections under SCATS (Signal Cost & Accounting Tracking System) and Autoscope control, FAST-TRAC use has grown:</p> <ul style="list-style-type: none"> • Currently nearly 6700 intersections using FAST-TRAC technology • More than 1300 Autoscope cameras • 35 communities have committed to FAST-TRAC and growing (600+ of 1500 total signalized intersections) • Michigan Department of Transportation installed SCATS at 13 intersections on M-59 (Waterford/Pontiac) with 15 planned to be installed on M-24 in 2004
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FAST-TRAC's Uniqueness	<ul style="list-style-type: none"> • First suburban adaptive traffic control system in US • First test of video detection for adaptive traffic control in the world • First Internet-based real-time traffic congestion map for non-freeway roads • First local unit of government to initiate an ITS project of this magnitude in the US • Largest adaptive signal system in North America • Largest video vehicle detection system in the world
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SEMSIM	<p>Another advanced management system in Michigan is SEMSIM.</p> <p>SEMSIM is the Southeastern Michigan Snow and Ice Management Project which:</p> <ul style="list-style-type: none"> • Is an Advanced Winter Fleet Management System • Uses electronics, Software, and Information Technologies • Involves an Historic Collaboration between the 4 Largest Local Road Agencies in Michigan: <p>They are:</p> <p style="padding-left: 100px;">Road Commission for Oakland County Wayne County Department of Public Services City of Detroit Department of Public Works Road Commission of Macomb County</p>
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SEMSIM's Participants	<p>Other Participants:</p> <ul style="list-style-type: none"> • Radio system of the regional bus system (SMART) is the communications backbone for SEMSIM • University of Michigan was original project facilitator • Both Michigan Department of Transportation and the Federal Highway Administration are assisting in the administration of the federal funds
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Goals of SEMSIM

SEMSIM's goals include:

1. Increase Safety and Mobility of Motorists
2. Reduce Costs of Winter Road Maintenance
3. Minimize Barriers between Road Agencies (geographic, institutional & jurisdictional)
4. Reduce Environmental Impact of Winter Road Maintenance by:
 - a. More effectively managing salt use
 - b. Reducing weather-related congestion
5. Create a Model for Other Regions and States to Emulate
6. Share Road Conditions Data with Travelers and Transit

Full implementation of SEMSIM will include equipping:

- Almost 500 winter maintenance vehicles *and*
 - 36 regional maintenance centers with-
 - information and communications hardware
 - the ability to monitor the fleet's activities via the Web
-

How Does SEMSIM Work?

Global Positioning System (GPS) Technology is used to track each truck. Truck locations are continually provided to the base station via the SMART radio system.

SEMSIM Web-based Application

- First System of its kind to utilize Web-based communications
 - Once fully-implemented, it will be the largest such system in the nation
 - No special software required at each workstation
 - Logon to the Internet for use
 - Accessible from home, office or vehicle
 - Each agency responsible for Internet access only
 - Hosted by 3rd party at a secure 24/7 Facility
-

Other SEMSIM Features

- Real-time Streaming Data
- Instantly Generates Customized Reports on Cost, Staff, Equipment, Materials, etc.
- Instantly Reports % Complete / Time to Complete
- Geographically-based Reporting (based on Routes)
- In-Vehicle Communications
 - Small computer display allows management and drivers to quickly and easily communicate non-verbally
 - Supervisors can send brief, preset messages to drivers
 - Drivers can respond with touch-screen preset messages

Future Enhancements:

- Interface to Forecasting
 - Dynamic Routing
-